March 5, 1863.

Major-General SABINE, President, in the Chair.

The Right Hon. Edward Pleydell Bouverie was admitted into the Society.

In accordance with the Statutes, the names of the Candidates for election into the Society were read, as follows:—

Henry Foster Baxter, Esq.
William Bovill, Esq., Q.C.
Sir Charles Tilstone Bright.
William Brinton, M.D.
John Charles Bucknill, M.D.
Capt. Richard Burton.
Lieut.-Col. John Cameron, R.E.
Thomas Spencer Cobbold, M.D.
Edward William Cooke, Esq., A.R.A.
William Crookes, Esq.
Henry Dircks, Esq.
Alexander John Ellis, B.A.
Henry Fawcett, Esq.
James Fergusson, Esq.
Frederick Field, Esq.
Rev. Robert Harley.
John Russell Hind, Esq.
William Charles Hood, M.D.
William Jenner, M.D.
Edmund C. Johnson, Esq.
Henry Letheby, M.B.
Sir Charles Locock, M.D.
Robert M^{c}Donnell, M.D.
Charles Watkins Merrifield, Esq.
Capt. Andrew Noble, R.A.
Professor Daniel Oliver.
George Wareing Ormerod, M.A.
Frederick William Pavy, M.D.
William Pengelly, Esq.
John George Perry, Esq.
Thomas Lambe Phipson, Ph.D.
Charles Bland Radcliffe, M.D.
Thomas Richardson, M.A.
Henry E. Roscoe, Ph.D.
William Henry Leighton Russell, B.A.
Rev. George Salmon, D.D.
Samuel James Augustus Salter, M.B.
Rev. Arthur Penrhyn Stanley, D.D.
Lieut.-Col. Alexander Strange, M.C.
Thomas Tate, Esq.
Charles Tomlinson, Esq.
Charles Wye Williams, Esq.
Lieut.-Col. Frederick Marow Eardley Wilmot, R.A.
Nicholas Wood, Esq.
Henry Worms, Esq.

The following communications were read:—

I. "On Skew Surfaces, otherwise Scrolls." By A. CAYLEY, F.R.S. Received February 3, 1863.

(Abstract.)

It may be convenient to mention at the outset that in the paper "On the Theory of Skew Surfaces," Camb. and Dubl. Math. Journ. vol. vi. pp. 171–173 (1852), I pointed out that upon any skew surface of the order n there is a singular (or nodal) curve meeting each generating line in $(n-2)$ points, and that the class of the circumscribed cone, or what is the same thing, the class of the surface, is equal to the order n of the surface. In the paper "On a Class of Ruled Surfaces," Camb. and Dubl. Math. Journ. vol. viii. pp. 45, 46 (1853), Dr. Salmon considered the surface generated by a line which meets three curves of the orders m, n, p respectively: such surface is there shown to be of the order $=2mnp$; and it is noticed that there are upon it a certain number of double right lines (nodal generators); to determine the number of these, it is necessary to consider the skew surface generated by a line meeting a given right line and a given curve of the order m twice; and the order of such surface is found to be $=\frac{1}{2}m(m-1)+h$, where h is the number of apparent double points of the curve. The theory is somewhat further developed in Dr. Salmon's memoir "On the Degree of a Surface reciprocal to a given one," Trans. R. Irish Acad. vol. xxiii. pp. 461–488 (read 1855), where certain minor limits are given for the orders of the nodal curves on the skew surface generated by a line meeting a given right line and two curves of the orders m and n respectively, and on that generated by a line meeting a given right line and a curve of the order m twice. And in the same memoir the author considers the skew surface generated by a line, the equations whereof are $(a, \ldots \mathcal{X} t, 1)^m = 0$ $(a^1, \ldots \mathcal{X} t, 1)^n = 0$, where $a, \ldots a^1, \ldots$ are any linear functions of the coordinates, and t is an arbitrary parameter. And the same theories are reproduced in the "Treatise on the Analytic Geometry of three Dimensions," Dubl. 1862. I will also, though it is less closely connected with the subject of the present memoir, refer to a paper by M. Chasles, "Description des Courbes à double Courbure de tous les ordres sur les surfaces reglées du troisième et du quatrième ordre," Comptes Rendus, t. liii. (1861, 2^e Sem.), pp. 884–889.

The present memoir (in the composition of which I have been assisted by a correspondence with Dr. Salmon) contains a further development of the theory of the skew surfaces generated by a line which meets a given curve or curves: viz. I consider,—1st, the surface generated by a line which meets each of three given curves of the orders m, n, p respectively; 2nd, the surface generated by a line which meets a given curve of the order m twice, and a given curve of the order n once; 3rd, the surface which meets a given curve of the order m three times; or, as it is very convenient to express it, I consider the skew surfaces, or say the "scrolls," $S(m, n, p)$, $S(m^2, n)$, $S(m^3)$. The chief results are embodied in the Table given after this introduction, at the commencement of the memoir. It is to be noticed that I attend throughout to the general theory, not considering otherwise than incidentally the effect of any singularity in the system of the given curves, or in the given curves separately: the memoir contains, however, some remarks as to what are the singularities material to a complete theory; and in particular as regards the surface $S(m^3)$. I am thus led to mention an entirely new kind of singularity of a curve in space—viz., such a curve has in general a determinate number of "lines through four points" (lines which meet the curve in four points); it may happen that of the lines through three points, which can be drawn through any point whatever of the curve, a certain number will unite together and form a line through four (or more) points, the number of the lines through four points (or through a greater number of points) so becoming infinite.

II. "Researches on the Refraction, Dispersion, and Sensitiveness of Liquids." By J. H. Gladstone, Ph.D., F.R.S., and the Rev. T. P. Dale, M.A., F.R.A.S. Received February 5, 1863.

(Abstract.)

This communication contains the results of some inquiries which were started by the authors in a previous paper "On the Influence of Temperature on the Refraction of Light"*. The same apparatus

* Phil. Trans. 1858, p. 887.